

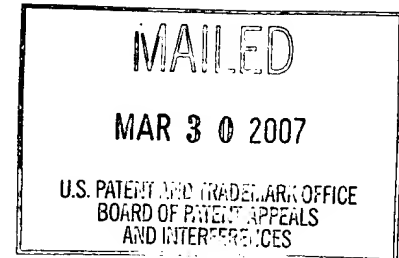
The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT  
APPEALS AND INTERFERENCES

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Ex parte KLAUS-LEO WILBUER,  
HERMANN HANS URLBERGER,  
RUDOLF DIERSCH, HERMANN STELZER,  
MATTHIAS PATZELT AND DIETER METHLING

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Appeal No. 2006-2755  
Application 09/446,623  
Technology Center 3600

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ORDER AND ERRATUM

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On March 2, 2007, a "Decision by Board" affirming the rejections was mailed to Appellants. The Board decision referenced two articles in footnotes 2 and 3 to the *Hawley's Condensed Chemical Dictionary* that was erroneously not attached with the decision.

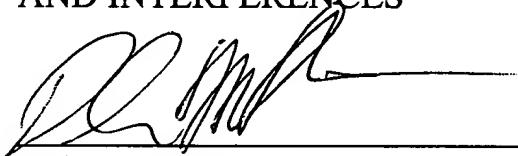
Appeal No. 2006-2755  
Application 09/446,623

The March 2, 2007 "Decision" is hereby being replaced by the decision mailed on even date herewith. All time periods for taking and subsequent action in connection with this appeal are to be calculated based on the date of the decision mailed herewith. Any confusion caused by the inadvertent error by the Board in the earlier "Decision" is regretted.

By Order of the

BOARD OF PATENT APPEALS  
AND INTERFERENCES

By:



Dale M. Shaw  
Chief Appeals Administrator  
(571) 272-9797

Encls:  
Form PTO-892 with attachments

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The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
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Decided: March 2, 2007

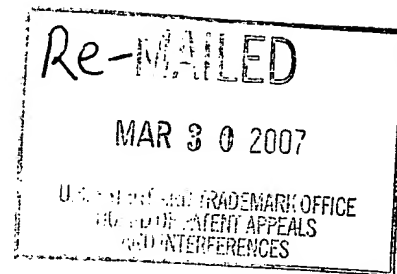
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Before BRADLEY R. GARRIS, CHUNG K. PAK, and  
PETER F. KRATZ, *Administrative Patent Judges*.

GARRIS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal involves claims 1-10, 12, and 13, the only claims pending in this application. We have jurisdiction over the appeal pursuant to 35 U.S.C. §§ 6 and 134.



We AFFIRM.

## INTRODUCTION

Appellants invented a shielding element having a coating for absorbing neutrons emitted by a nuclear reaction of radioactive materials and a method of producing a coating to absorb neutrons (claims 1 and 13). The shielding element's coating comprises boron or boron compounds embedded in a nickel matrix (Specification 3). The concentration of boron or boron compounds in the coating is more than 20% by volume (Specification 3, claims 9, 10, and 13). The method of producing the coating includes providing a dispersion bath of nickel and boron and/or boron compounds, contacting the shielding element with the dispersion bath so as to coat the surface of the shielding element, and providing intermittent relative movement between the surface to be coated and the dispersion bath during the contacting process (claim 1). Claims 1 and 13<sup>1</sup> are illustrative:

1. A method for producing a coating for absorbing neutrons created in a nuclear reaction of radioactive materials, the method comprising:

providing a basic material forming a shielding element;

providing a dispersion bath whereby a dispersion of the dispersion bath comprises nickel and boron and/or compounds of boron;

contacting the shielding element at least partly with the dispersion in the dispersion bath thereby providing a coating wherein

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<sup>1</sup> Claim 13 recites "the coating process" (line 11) and "said base material" (line 13). These phrases lack antecedent basis in the claim such that the definiteness requirement of 35 U.S.C. § 112, 2<sup>nd</sup> paragraph may not be satisfied. These matters should be addressed in any further prosecution of this application.

boron and/or compounds of boron are embedded in a nickel matrix on the contacted surface of the shielding element;

providing at least intermittently a relative movement between the surface to be coated and the dispersion bath during the contacting process; and

separating the shielding element from the dispersion bath.

13. A shielding element having a coating for absorbing neutrons created in a nuclear reaction of radioactive materials, the coating manufactured by a method comprising:

providing a basic material forming a shielding element;

providing a dispersion bath whereby a dispersion of the dispersion bath comprises nickel and boron and/or compounds of boron;

contacting the shielding element at least partly with the dispersion in the dispersion bath thereby providing a coating wherein boron and/or compounds of boron are embedded in a nickel matrix on the contacted surface of the shielding element and providing at least intermittently a relative movement between the surface to be coated and the dispersion bath during the coating process; and

separating the shielding element from the dispersion bath; and

wherein said base material formed by an inorganic material and said coating has more than 20% by volume of boron and/or compounds of boron thereof embedded in a nickel matrix.

The Examiner relies on the following prior art references as evidence of unpatentability:

Kendall	US 3,616,279	Oct. 26, 1971
Wang	US 4,238,299	Dec. 9, 1980
Baburek (as Translated)	EP 55,679	Jul. 7, 1982

The rejections as presented by the Examiner are as follows:

1. Claim 13 is rejected under 35 U.S.C. § 102(b) as unpatentable over Baburek.
2. Claims 1-10, and 13 are rejected under 35 U.S.C. § 103(a) as unpatentable over Baburek in view of Wang.
3. Claim 12 is rejected under 35 U.S.C. § 103(a) as unpatentable over “Wang and Baburek in view of Wang as applied to claims 1-10 above, and further in view of . . . Kendall.”

Rather than reiterate the respective positions advocated by the Appellants and by the Examiner concerning these rejections, we refer to the Brief and the Reply Brief, and to the Answer respectively for a complete exposition thereof.

## OPINION

### 35 U.S.C. § 102(b) REJECTION OVER BABUREK

The Examiner rejected claim 13 under § 102(b) over Baburek. The Examiner stated that Baburek discloses “a shielding element having boron carbide content of 50 wt. % in the nickel matrix” (Answer 3). The Examiner indicated since claim 13 is a product-by-process claim, the product is “unpatentable if the product is the same as or obvious from a product of the prior art . . . even though the prior [art] product was made by a different process” (Answer 3). The Examiner further stated Baburek discloses a process where a homogeneous coating of nickel coated boron carbide is deposited on stainless steel (Answer 3-4).

Appellants argue Baburek's coating is not the same as the coating achieved using Appellants' process (Br. 9). While Appellants recognize that Baburek discloses a boron carbide-nickel layer, Appellants contend that Baburek's disclosure to add a nickel coating atop the boron carbide-nickel layer for wear resistance demonstrates Baburek's coating is not the same as Appellants' coating (Reply Br. 5). Appellants contend that Baburek prefers the two layer coating structure (Reply Br. 5).

The Examiner responds that Appellants are comparing with their claimed invention the second embodiment in Baburek wherein layers of boron carbide embedded in nickel alternate with nickel layers, instead of the first embodiment which the Examiner cited against claim 13 (Answer 7). The Examiner maintains that Baburek discloses forming a homogeneous boron carbide-nickel layer with 20 to 50% by weight boron carbide on a stainless steel substrate (Answer 7). According to the Examiner, Baburek's disclosure satisfies claim 13 (Answer 7).

We agree with the Examiner's ultimate finding that claim 13 is anticipated by Baburek.

The only dispute between Appellants and the Examiner is whether the additional layer of nickel on the nickel-boron carbide coating renders the Examiner's anticipation rejection improper. Appellants do not argue in either their Brief or Reply Brief that the boron carbide weight percent disclosed by Baburek (i.e., 20 to 50% by weight) does not include Appellants' claim to "more than 20% by volume of boron and/or compounds of boron." Accordingly, our analysis focuses on whether the claims are anticipated in view of Baburek's disclosure of the additional nickel layer.

We observe claim 13 does not require only one layer be formed on the “basic material.” Rather, claim 13 uses the open-ended transitional claim language “comprising.” This open-ended transitional phrase does not exclude any additional features to the claim, including an additional layer of nickel. *Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1371-73, 74 USPQ2d 1586, 1589-91 (Fed. Cir. 2005).

Furthermore, Baburek discloses that the additional nickel or stainless steel layer “may” be applied to the nickel-boron carbide coating to provide protection thereto (Baburek translation 12). Hence, by Baburek’s own words, the final nickel coating is optional and thus not required.

As the Examiner found, Baburek’s “Example 1” embodiment discloses a neutron absorbing shielding device having a homogeneous boron carbide-nickel coating (Baburek 9, 11). Accordingly, we agree with the Examiner’s finding that, since Baburek discloses forming a homogeneous boron carbide-nickel coating on a stainless steel substrate to produce a shielding element, the product features of product-by-process claim 13 are satisfied.

We affirm the § 102(b) rejection of claim 13 over Baburek.

## 35 U.S.C. § 103(a) REJECTION OVER BABUREK IN VIEW OF WANG

### CLAIM 1

The Examiner rejected claims 1-10, and 13 over Baburek in view of Wang. The Examiner found that Baburek discloses “a boron-nickel shielding element” (Answer 4). However, the Examiner found that “Baburek does not disclose a dispersion bath and a relative movement



between the bath and a surface to be coated as claimed” (Answer 4). The Examiner found Wang discloses using a dispersion bath to manufacture nuclear radiation shields including relative movement, provided at least intermittently, between the bath and surface to be coated (Answer 4). Based on these findings, the Examiner concluded that it would have been obvious to one having ordinary skill in the art to manufacture the boron-nickel shielding element of Baburek using Wang’s process because “doing so would . . . achieve an even distribution of boron particles” (Answer 4).

Appellants argue Baburek and Wang fail to disclose a dispersion bath during the contacting process (Br. 10, 11, 13). Regarding Baburek’s disclosure, Appellants argue Baburek does not teach a dispersion, but, rather, formation of a coating using a plasma torch (Br. 13). Regarding Wang’s disclosure, Appellants argue the boron carbide particles in Wang’s process physically settle out of the electrolyte mixture during deposition (Br. 11). According to Appellants, such a settling of the boron carbide particles during the “contacting process” demonstrates that no dispersion is present during the “contacting process” (Br. 11). Appellants reason that, because there is no “dispersion” of particles, there can be no intermittent movement relative to a “dispersion” during the contacting process (Br. 11).

Appellants further argue Wang’s application of electrical current to his electrolyte solution during stirring of the boron carbide particles will not result in the boron carbide particles settling during the stirring operation (Br. 13). Appellants maintain boron carbide is non-conductive and, thus, would not be affected by the electrical current (Br. 13). Appellants determine that in Wang, “when there is a dispersion of boron carbide particles, the particles are not coated, and when the particles are coated there is not a dispersion of

boron carbide particles, but a population of ‘settling’ boron carbide particles” (Br. 13). Based on the aforementioned arguments, Appellants indicate their claim feature, a dispersion during the contacting process, is shown by neither Baburek nor Wang (Br. 14).

Appellants also argue lack of motivation for the combination of Wang’s dispersion bath with Baburek’s coating process (Br. 14). Specifically, Appellants argue that Baburek discloses using a plasma torch to apply the boron carbide-nickel coating, whereas Wang uses an electrochemical method to apply a boron carbide-copper coating (Br. 14). Further advancing their lack of motivation argument, Appellants contend that neither Baburek nor Wang discloses an electrochemical method for depositing a nickel and boron carbide coating (Br. 14). Appellants further contend that nickel and copper are different elements having different properties such that there would have been no motivation to combine a method which is suitable for use with copper (i.e., Wang’s process) with a method suitable for use with nickel (i.e., Baburek’s process) (Br. 14).

Appellants also argue that there is no reasonable expectation of success “for using an electrochemical method as taught in Wang to form a nickel and boron carbide coating” (Br. 14). Appellants contend that Baburek’s use of a plasma torch to apply the boron carbide-nickel coating is “quite distinct” from Wang’s electrochemical method such that there is no reasonable expectation of success in utilizing the coating materials disclosed in Baburek (i.e., nickel and boron carbide) in an electroplating method as disclosed in Wang (Br. 14).

The Examiner responds that he interprets the claim 1 step “providing at least intermittently a relative movement between the surface to be coated

and the dispersion bath during the contacting process” as the “entire coating process from start to finish and not necessarily defined by the actual contact of the boron with the substrate” (Answer 8). Using this interpretation, the Examiner finds that Figure 2A of Wang shows that a uniform suspension of boron carbide particles is present during the “contacting process” (Answer 8). Moreover, the Examiner contends that Figure 2A of Wang “makes . . . clear that boron particles at the bottom of the suspension will contact the substrate before the stirrers are turned off (Answer 8). In addition, the Examiner indicates that even if the stirrers were turned off, fluid dynamics principles indicate that there would be continuous motion between the bath and the substrate (Answer 8).

Appellants counter that the Examiner’s interpretation of “contacting process” is not correct (Reply Br. 7). Rather, Appellants assert that “contacting” is not the entire coating process, but the process during which the substrate is actually contacted with the boron to form a coating (Reply Br. 7). Appellants contend, when Wang turns off his stirrers to allow the particles to settle, there is no relative motion during the electroplating process (Reply Br. 7). Appellants indicate that allowing the boron carbide particles to settle is not “contacting” to produce a coating as is presently claimed (Reply Br. 7-8). Appellants contend the Examiner has engaged in impermissible hindsight in rejecting Appellants’ claims (Reply Br. 8-9).

We agree with the Examiner’s ultimate conclusion that claim 1 is unpatentable under § 103(a) over Baburek in view of Wang.

Appellants’ two argued distinctions are directed to whether Wang discloses the following features: (1) a dispersion bath and (2) relative movement between the surface to be coated and the dispersion bath during

the contacting process. We agree with the Examiner that Wang discloses both of the argued distinctions. Furthermore, we sustain the § 103(a) rejection of claim 1 over the combination of Baburek in view of Wang for the reasons discussed below.

As the Examiner stated, Wang shows in Figure 2A that the boron carbide particles 26 are uniformly suspended in the electrolyte solution. Wang further discloses that while the boron carbide particles are being dispersed in the electrolyte, a thin layer of copper is plated on the exposed upper surface of the tube (Wang, col. 3, ll. 22-25). Because Wang does not disclose masking or protecting the surface during the stirring phase, it would be impossible to prevent particle-to-substrate contact while stirring. Hence, the Examiner was reasonable in determining that there would be boron carbide particle contact with the substrate during the stirring (i.e., relative movement) of the electrolyte solution to disperse the particles.

Moreover, Wang discloses in the Figure 8 embodiment that tube 18 is mounted in drum 50 such that tube 18 is coaxial with the longitudinal axis of the drum 50 (Wang, col. 5, ll. 6-9). Electrolyte and boron carbide particles are introduced into the annular space formed by the outer surface of tube 18 and the inner surface of drum 50 (Wang, col. 5, ll. 10-15). The drum 50 and tube 18 rotate together such that “the electrolyte is induced to rotate through drag forces and the carbide particles also circulate and fall evenly onto the outside surfaces of the . . . tubing continuously” (Wang, col. 5, ll. 15-20).

Wang’s Figure 8 embodiment demonstrates that tube 18 rotates relative to the electrolyte-boron carbide dispersion (i.e., the circulating boron carbide particles). Moreover, Wang discloses during the relative movement boron carbide particles circulating in the electrolyte “continuously” and

“evenly” fall on the outer surface of the tube (Wang col. 5, ll. 18-19).

Therefore, Wang’s Figure 8 embodiment discloses Appellants’ two argued distinctions: relative movement between the surface to be coated and the dispersion bath during the contacting process, and a dispersion bath.

Appellants’ argument that Wang’s Figure 8 embodiment does not include a dispersion during the contacting process is unpersuasive because otherwise the boron carbide particles would not settle on the surface to be coated (Br. 11). In this regard, *Hawley’s Condensed Chemical Dictionary* defines dispersion as a two-phase system where one phase consists of finely divided particles distributed throughout a bulk substance.<sup>2</sup>

Moreover, *Hawley’s* states that under natural conditions the distribution in the dispersion is seldom uniform and that larger particles “settle out” of the dispersion. Therefore, contrary to Appellants’ argument, particles in a dispersion settle out. Furthermore, Appellants’ Specification states their coating process functions by having the particles settle out of the dispersion, via gravity, onto the surface to be coated (Specification 4). Hence, if we accept Appellants’ argument that a mixture where particles settle out is not a “dispersion,” then Appellants likewise fail to disclose a “dispersion.”

We are unpersuaded by Appellants’ argument that Baburek in view of Wang lacks motivation for the combination of disclosures. Baburek discloses an electrolytic technique for embedding boron carbide in nickel (Baburek 12-16). Baburek’s technique comprises electrolytically depositing a layer of nickel on the surface of an object, sprinkling the boron carbide

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<sup>2</sup> *Hawley’s Condensed Chemical Dictionary*, 12<sup>th</sup> Ed., p. 435, “dispersion” (© 1993).

particles on the deposited layer of nickel, and then continuing the electrolytic deposition of nickel such that nickel encapsulates the boron carbide (Baburek 12-16).

Wang discloses forming a boron carbide-copper coating in the same manner as Baburek's process. Namely, electrolytically depositing the metal (i.e., copper in Wang) onto a surface, depositing boron carbide particles and then encapsulating the deposited boron carbide particles in a metal (i.e., copper) layer (Wang col. 3, ll. 22-33).

From the teachings of Baburek and Wang, we find that one of ordinary skill would have been motivated to combine Wang's method of depositing boron carbide using a dispersion with Baburek's electrolytic nickel deposition method in order to provide a more even coating (Wang, col. 4, ll. 48-54) and to make Baburek's process more efficient. Wang's method of depositing boron carbide particles by adding the particles to the electrolyte solution saves time by avoiding the following repetitive sequence of steps required by Baburek's process: (1) removal of the substrate from the electrochemical bath, (2) addition of boron carbide particles, and (3) reinsertion of the boron carbide coated substrate in the electrolytic bath for additional metal disposition (Baburek, "Example 2," 12-16).

We are equally unpersuaded by Appellants' argument that the combination of Baburek in view of Wang lacks a reasonable expectation of success. As explained earlier in our decision, Baburek and Wang disclose a similar process for electrolytically forming a metal (i.e., nickel in Baburek and copper in Wang) and boron carbide layer on the surface of a neutron shielding device. Moreover, Wang indicates his process may be used with any "matrix metal" and that copper is merely exemplary (i.e., "matrix metal

such as copper”) (Wang col. 2, ll. 8-9). Furthermore, Baburek discloses that other methods may be used to manufacture the neutron-absorbent coating (Baburek 17, ll. 5-7), which reasonably includes Wang’s similar method.

Based on Wang’s and Baburek’s aforementioned disclosures, we conclude that one of ordinary skill in the art would have reasonably expected success in combining Wang’s boron carbide dispersion deposition method with Baburek’s electrolytic nickel-boron deposition method. *In re O’Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988).

Accordingly, we affirm the rejection of claim 1 under § 103(a) over Baburek in view of Wang.

#### CLAIMS 2-4

Claim 2 recites “relative movement is produced by moving the element to be coated through the dispersion bath.” Claim 3 recites that the “surface to be coated is arranged in a direction to the surface of the dispersion bath.” Claim 4 recites “a dispersion bath with boron carbide is used.”

Appellants reiterate their argument that neither Baburek nor Wang discloses a dispersion bath and hence the various features of these claims that require a dispersion bath could not be taught or suggested by Baburek or Wang (Br. 15).

We are unpersuaded by Appellants’ argument that Baburek and Wang fail to disclose a dispersion bath for the same reasons we were not convinced by this argument with respect to the rejection of claim 1. As we discussed above regarding claim 1, Wang discloses a dispersion bath and there is

motivation and a reasonable expectation of success in combining Wang's dispersion bath with Baburek's coating process.

We affirm the rejection of claims 2-4 under § 103(a) over Baburek in view of Wang.

#### CLAIM 5

Claim 5 recites "wherein a dispersion bath with boron in element form is used."

The Examiner rejected claim 5 under § 103(a) over Baburek in view of Wang (Answer 4). The Examiner determined that it would have been obvious to remove the carbon from boron carbide in order to "eliminate the abrasive properties of the boron carbon compound . . . [and] physically allow more boron to be embedded in another metal as a result of the increase in molecular spacing" (Answer 5).

Appellants reiterate their argument that neither Wang nor Baburek discloses using a dispersion bath. Appellants further argue that it would not have been obvious to remove the carbon from the boron carbide compound to form elemental boron (Br. 16). Appellants contend elemental boron and boron carbide have a different chemistry, such that elemental boron is highly reactive and hard to handle, whereas boron carbide is stable and easy to handle (Br. 16).

Appellants' Specification indicates, via admitted prior art, elemental boron and boron carbide have been used to make neutron shielding devices (Specification 1). *In re Nomiya*, 509 F.2d 566, 571-72, 184 USPQ 607,



612-13 (CCPA 1975). Moreover, Baburek discloses the amount of boron 10, a naturally occurring isotope of elemental boron<sup>3</sup>, in the coating controls the degree of neutron absorption (Baburek 4). Thus, Baburek suggests a desire to increase the amount of boron 10 (i.e., boron in an elemental form) in the coating.

Accordingly, in view of the prior art teachings to use boron in elemental form to manufacture shielding devices, it would have been prima facie obvious to substitute boron in elemental form for boron carbide used in Baburek and Wang's processes since the teachings of the references as a whole suggest a desire to increase the amount of boron into the coating. *In re Fulton*, 391 F.3d 1195, 1200-01, 73 USPQ2d 1141, 1145-46 (Fed. Cir. 2004) (explaining the prior art as a whole must suggest the desirability of the combination).

We affirm the § 103(a) rejection of claim 5 over Baburek in view of Wang.

#### CLAIMS 6 and 7

Claim 6 recites "the coating is formed chemically." Claim 7 recites "the coating is formed electrolytically."

The Examiner rejected claims 6 and 7 under § 103(a) over Baburek in view Wang (Answer 4).

As to claim 6, Appellants argue that Baburek's formation of a coating using a plasma torch is not a chemical, but rather a physical coating method (Br. 16). As to claim 7, Appellants contend that Wang does not disclose an

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<sup>3</sup> *Hawley's Condensed Chemical Dictionary*, 12<sup>th</sup> Ed., p. 163, "boron" (© 1993).

electrolytic method of coating the entire coating (i.e., copper and boron carbide) (Br. 16). Rather, Appellants contend Wang only electrolytically deposits the copper, not the boron carbide (Br. 16).

Regarding claim 6, Baburek discloses an electrolytic and chemical method of coating the shielding device (Baburek 12-17). Moreover, Baburek discloses the “operations performed” using the chemical coating method are “identical” to the operations performed in the electrolytic coating method (Baburek 16; Example 3). Accordingly, it would have been *prima facie* obvious to one of ordinary skill in the art to use Baburek’s chemical coating method instead of the electrolytic coating method to achieve the same coating on the shielding device.

Regarding claim 7, Baburek discloses electrolytically depositing nickel and encapsulating boron carbide particles cast onto the nickel layer by depositing the nickel around the cast boron carbide particles (Baburek 12-16). Similarly, Wang electrolytically deposits metal (e.g., copper) while boron carbide particles settle on the surface of the depositing metal such that the metal encapsulates (i.e., embeds) the deposited particles.

Appellants disclose the same method as Baburek and Wang (i.e., gravity settling of particles followed by encapsulation (i.e., embedding) with a deposit of metal) (Specification 3: 12-14; 4: 12-16). We find no disclosure in Appellants’ Specification, and Appellants failed to provide any citation in their Argument, that the boron carbide particles are being electrolytically deposited at the same time as the metal. In fact, as Wang discloses and Appellants have earlier pointed out (Br. 13, ll. 22-25), the boron carbide particles are non-conductive, such that their deposition would not be affected

by the presence of an electrical current during the metal deposition. Rather, the non-conductive boron carbide particles would be deposited by gravity.

We affirm the § 103(a) rejection of claims 6 and 7 over Baburek in view of Wang.

#### CLAIM 8

Claim 8 recites that the coating thickness produced by the method ranges from “350 to 500  $\mu\text{m}$ .”

The Examiner rejected claim 8 under § 103(a) over Baburek in view of Wang. The Examiner stated that “one of ordinary skill in the art using the process of Wang to manufacture the shielding of Baburek would find it obvious to provide a sufficient quantity of coating material to achieve the properties of a shielding element having the claimed thickness” (Answer 6).

Appellants argue, since the method used by Baburek in view of Wang is not the same as Appellants’ method and Baburek and Wang fail to indicate what coating thicknesses they achieve, “it is unclear if [Baburek’s and Wang’s] disclosed methods would be suitable to produce a coating having the presently claimed thickness” (Br. 16).

As the Examiner indicates, the quantity of coating (i.e., coating thickness) would determine how well the coated shielding device would function to block neutrons (Answer 6). In another words, the coating thickness is an art-recognized, result-effective variable for controlling the shielding properties. Baburek further discloses coating thickness is recognized in the art as a result effective variable (Baburek 5, ll. 6-16; 6, ll. 9-10; 9, ll. 1-5; 10, ll. 1-2; 12, ll. 1-2; 15, ll. 14-17; 16, ll. 10-14).

Generally, it would have been obvious for an artisan with ordinary skill to develop workable or even optimum ranges for such art-recognized, result-effective parameters. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-1937 (Fed. Cir. 1990); *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980); *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). From the foregoing case law, determining the optimum shielding device coating thickness range to be “350 to 500  $\mu\text{m}$ ” would have been *prima facie* obvious.

We affirm the § 103(a) rejection of claim 8 over Baburek in view of Wang.

#### CLAIMS 9 AND 10

The Examiner rejected claims 9 and 10 under § 103(a) over Baburek in view of Wang. The Examiner stated that Baburek “discloses a boron carbide content of 50 wt.>%” (Answer 6).

Appellants argue Baburek’s and Wang’s methods are different from Appellants’ claimed method because “neither Baburek nor Wang discloses a dispersion solution as presently claimed” (Br. 17).

Appellants do not contest that Baburek’s disclosure of a “boron carbide content of 50 wt.>%” includes Appellants’ claimed boron carbide concentration of “more than 20% by volume” (claim 9) or “more than 40% by volume” (claim 10). Rather, Appellants argue that neither Baburek nor Wang discloses a “dispersion solution” (Br. 17). However, as we discussed above in the CLAIM 1 section of this opinion, Wang teaches a “dispersion,” and the combination of Wang with Baburek would have been *prima facie* obvious in light of the motivation provided by the references and the

reasonable expectation of success for the combination of Wang's dispersion and relative movement between the dispersion and substrate with Baburek's coating method. See our discussion in the CLAIM 1 section.

We affirm the § 103(a) rejection of claims 9-10 over Baburek in view of Wang.

#### CLAIM 13

The Examiner rejected claim 13 under § 103(a) over Baburek in view of Wang (Answer 4).

Appellants make the same arguments earlier presented with regard to the § 102(b) rejection of product-by-process claim 13. Appellants add that Wang does not disclose a coating containing nickel (Br. 17).

We refer Appellants to the 35 U.S.C. § 102(b) REJECTION OVER BABUREK section for our response to their arguments made previously with respect to the § 102(b) rejection.

Regarding, Appellants' argument that Wang does not teach using nickel, we add that Baburek discloses an electrolysis method, similar to Wang's method, that deposits nickel. Moreover, Wang suggests that metals, other than copper, may be suitable for use with his process (Wang col. 2, ll. 8-10, "...matrix of metal such as copper. . .").

For the foregoing reasons, we affirm the § 103(a) rejection of claim 13.

**35 U.S.C. § 103(a) OVER BABUREK IN VIEW OF WANG AND  
KENDALL**

**CLAIM 12**

The Examiner rejected claim 12 under § 103(a) over Baburek in view of Wang and Kendall. The Examiner stated that it would have been obvious “to provide Wang and Baburek with the glass container of Kendall . . . to allow the operator to observe the [electrolytic coating] process” (Answer 6).

Appellants have not separately argued the § 103(a) rejection of claim 12. Rather, Appellants’ arguments with respect to claim 1 are applied to the rejection of claim 12. These arguments are unpersuasive for the same reasons they were unpersuasive regarding the rejection of claim 1. See our discussion in the CLAIM 1 section.

We affirm the § 103(a) rejection of claim 12 over Baburek in view of Wang and Kendall.

**CONCLUSION**

We have affirmed the § 102(b) rejection of claim 13 over Baburek.

We have affirmed the § 103(a) rejection of claims 1-10 and 13 over Baburek in view of Wang.

We have affirmed the § 103(a) rejection of claim 12 over Baburek in view of Wang and Kendall.

The Examiner’s decision is affirmed.

Appeal 2006-2755  
Application 09/446,623

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(2006).

**AFFIRMED**

tf/cam

Cantor Colburn, LLP  
55 Griffin Road South  
Bloomfield, CT 06002

<b>Notice of References Cited</b>	Application/Control No. 09/446,623	Applicant(s)/Patent Under Reexamination WILBUER ET AL.	
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**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
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**FOREIGN PATENT DOCUMENTS**

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	S					
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**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Hawley's Condensed Chemical Dictionary, 12 <sup>th</sup> Ed., p. 435, "dispersion", © 1993.
	V	Hawley's Condensed Chemical Dictionary, 12 <sup>th</sup> Ed., p. 163, "boron", © 1993.
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



*Hawley's*  
*Condensed Chemical*  
*Dictionary*

*TWELFTH EDITION*

*Revised by*  
Richard J. Lewis, Sr.

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VAN NOSTRAND REINHOLD COMPANY

New York

**disodium orthophosphate.** See sodium phosphate, dibasic.

**disodiumphenyl phosphate.**  $C_6H_5Na_2PO_4$ .  
Properties: White powder, soluble in water, insoluble in acetone and ether.  
Use: Reagent for milk pasteurization.

**disodium phosphate.** See sodium phosphate, dibasic.

**disodium pyrophosphate.** See sodium pyrophosphate, acid.

**disodium tartrate.** See sodium tartrate.

**disperse dye.** See dye, disperse.

**disperse phase.** See phase (2); colloid chemistry.

**dispersing agent.** A surface-active agent added to a suspending medium to promote uniform and maximum separation of extremely fine solid particles, often of colloidal size. True dispersing agents are polymeric electrolytes (condensed sodium silicates, polyphosphates, lignin derivatives); in non-aqueous media sterols, lecithin and fatty acids are effective.

Use: Wet grinding of pigments and sulfur; preparation of ceramic glazes, oil-well drilling muds, insecticidal mixtures, carbon black in rubber, and water-insoluble dyes.  
See also emulsion; detergent.

**dispersion.** (1) A two-phase system where one phase consists of finely divided particles (often in the colloidal size range) distributed throughout a bulk substance, the particles being the disperse or internal phase and the bulk substance the continuous or external phase. Under natural conditions, the distribution is seldom uniform; but under controlled conditions, the uniformity can be increased by addition of wetting or dispersing agents (surfactants) such as a fatty acid. The various possible systems are: gas/liquid (foam), solid/gas (aerosol), gas/solid (foamed plastic), liquid/gas (fog), liquid/liquid (emulsions), solid/liquid (paint), and solid/solid (carbon black in rubber). Some types, such as milk and rubber latex, are stabilized by a protective colloid which prevents agglomeration of the dispersed particles by an adherent coating. Solid-in-liquid colloidal dispersions (loosely called solutions) can be precipitated by adding electrolytes which neutralize the electrical charges on the particles. Larger particles will gradually coalesce and either rise to the top or settle out, depending upon their specific gravity.

See also suspension, colloid chemistry.

(2) In the field of optics, dispersion denotes the retardation of a light ray, usually resulting in a

change of direction as it passes into or out of a substance, to an extent depending on the frequency. Dispersion is a critically important property of optical glass.  
See also refraction.

**"Dispersite" [Uniroyal].** TM for water dispersions of natural, synthetic, and reclaimed rubbers and resins.

Use: Adhesives for textiles; paper, shoes, leather, tapes; coatings for metal, paper, fabrics, carpets; protective (stripable) for saturating paper, felt, book covers, tape, jute pads; for dipping tire cords. Can be applied by spraying, spreading, impregnation, saturation.

**"Disperson" [Witco].** TM for wettable grades of zinc, calcium, and other metallic stearates.  
Use: Where easy dispersion in water is desired.

**"Disperson OS" [ICI].** TM for an oil-soluble emulsifying agent comprised of an 8% solution of a polyethenoxy compound in isopropanol. Designed especially for dispersion of oil spills in seawater. Claimed to be biodegradable and to have low toxicity for fish and other marine organisms. Amount needed said to be from 20-25% of the oil volume.

**displacement.** Chemical change in which one element enters a compound in place of another, the latter being set free.

**displacement series.** See activity series.

**disposal, waste.** See waste control, chemical waste, radioactive waste.

**disproportionation.** A chemical reaction in which a single compound serves as both oxidizing and reducing agent and is thereby converted into a more oxidized and a more reduced derivative. Thus, a hypochlorite upon appropriate heating yields a chlorate and a chloride, and an ethyl radical formed as an intermediate is converted into ethane and ethylene.  
See also transalkylation.

**dissociation.** The process by which a chemical combination breaks up into simpler constituents as a result of either (1) added energy, as in the case of gaseous molecules dissociated by heat, or (2) the effect of a solvent on a dissolved polar compound (electrolytic dissociation), e.g., water on hydrogen chloride. It may occur in the gaseous, solid, or liquid state or in solution. All electrolytes dissociate to a greater or less extent in polar solvents. The degree of dissociation can be used to determine the equilibrium constant

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to 3000C; Mohs hardness from 8 to 10; thermally and electrically conductive; high chemical stability; do not react with hydrochloric or hydrofluoric acids but are attacked by hot alkali hydroxides; color varies from gray (transition-metal) to black (alkaline-earth) to blue (rare-earth).

Derivation: (1) Sintering mixtures of metal powder and boron at 2000C; (2) reduction of mixture of the metal oxide and boric oxide with aluminum, silicon, or carbon; (3) fused-salt electrolysis; (4) vapor-phase deposition.

Use: High-temperature service as rocket nozzles, turbines, etc.

**borneol.** (bornyl alcohol; 2-camphanol; 2-hydroxycamphane). CAS: 507-70-0.  
 $C_{10}H_{17}OH$ .

Properties: White, translucent lumps; sharp, camphor-like odor; burning taste; soluble in alcohol and ether; insoluble in water. Optically active in natural form, racemic form made synthetically. D 1.011, mp 208C, bp 212C. Flammable.

Derivation: Natural form from a species of tree in Borneo and Sumatra. Synthesized from camphor by hydrogen reduction or from  $\alpha$ -pinene.

Grade: Technical.

Hazard: Fire risk in presence of open flame.

Use: Perfumery, esters.

**Born equation.** An equation representing the free energy of solvation of an ion.

**bornyl acetate.**  $C_{10}H_{17}OOCCH_3$ .

Properties: Colorless liquid, solidifying to crystals at approximately 50F, piny-camphoraceous odor. Soluble in 3 volumes of 70% alcohol, miscible with 95% alcohol and with ether, d 0.980-0.984, refr index 1.463-1.465, mp 29C. Combustible.

Derivation: Interaction of borneol and acetic anhydride in the presence of formic acid.

Grade: Technical, FCC.

Use: Perfumery, flavoring, nitrocellulose solvent.

**bornyl alcohol.** See borneol.

**bornyl formate.**  $C_{10}H_{17}OOCH$ .

Properties: Colorless liquid having a piny odor, d 1.007-1.009. Combustible.

Grade: Technical.

Use: Perfuming of soaps, disinfectants, and sanitary products; flavoring.

**bornyl isovalerate.**  $C_{10}H_{17}OOC_3H_7$ . A constituent of valerian oil.

Properties: Limpid fluid, aromatic, valerian-like odor. Soluble in alcohol and ether, insoluble in

water, d 0.951 (20C), bp 255-260C. Combustible.

Use: Medicine, essential-oil intermediate, flavoring.

**boroethane.** See diborane.

**boron.** B Nonmetallic element of atomic number 5; group IIIA of the periodic table. Atomic weight 10.81. Valence 3. Two stable isotopes: 11 (approximately 81%) and 10 (approximately 19%).

Properties: Black, hard solid; brown, amorphous powder; crystals. Highly reactive. Soluble in concentrated nitric and sulfuric acids; insoluble in water, alcohol, and ether. High neutron absorption capacity. Amphoteric. A plant micro-nutrient. D 2.45, mp 2300C, Mohs hardness 9.3. Sources: Borax, kernite, colemanite, ulexite.

Derivation: (1) By heating boric oxide with powdered magnesium or aluminum; (2) by vapor-phase reduction of boron trichloride with hydrogen over hot filaments (80-2000C); (3) by electrolysis of fused salts.

Forms: Filament, powder, whiskers, single crystals.

Grade: Technical (90-92%), 99% pure, high-purity crystals.

Hazard: Dust ignites spontaneously in air; severe fire and explosion hazard. Reacts exothermally with metals above 900C; explodes with hydrogen iodide.

Use: Special-purpose alloys, cementation of iron, neutron absorber in reactor controls, oxygen scavenger for copper and other metals, fibers and filaments in composites with metals or ceramics, semiconductors, boron-coated tungsten wires, rocket propellant mixtures, high-temperature brazing alloys.

See also boron alloy, boron fiber, boron-10.

**boron-10.** Nonradioactive isotope of boron of mass number 10.

Properties: Has marked capacity for absorbing slow neutrons, emitting a high-energy  $\alpha$ -particle in the process.

Derivation: Constitutes approximately 19% of natural boron.

Forms available: Crystalline powder, dry amorphous powder, colloidal suspension of dry amorphous powder in oil; in boron trifluoride-calcium fluoride, in potassium borofluoride, in boron trifluoride ethyl etherate, in boric acid.

Use: Neutron counter, radiation shielding (in the form of boral), medicine.

**boron alloy.** A uniformly dispersed mixture of boron with another metal or metals. Ferrobore usually contains 15-25% boron, manganese boron usually 60-65% manganese.

Use: Degasifying and deoxidizing agents, to